

【特許請求の範囲】

【請求項1】 レーザー発信装置から探査目標物に向けて発信レーザー光束線を発射し、該探査目標物から反射された受信レーザー光束線を受信して探査目標物を走査する光学走査装置において、

光学走査装置本体の枠体に形成された装着孔に筒部が回転自在に装着された回転ミラー装置と、該回転ミラー装置を回転駆動する駆動手段とを有し、前記回転ミラー装置は、軸線が前記筒部の軸線と直角に交わる位置に設けられた開口部と、前記筒部の軸線に対し45度の角度で固定された第1のミラーとを備え、前記探査目標物に対する発信及び受信レーザー光束線が前記筒部を通り、前記第1のミラーにより前記発信及び受信レーザー光束線が90度曲折されて前記開口部を通過することを特徴とする光学走査装置。

【請求項2】 請求項1に記載の光学走査装置において、光学走査装置本体側に設けられ、前記筒部の軸線に対し45度の角度で固定された第2のミラーを有し、該第2のミラーに前記レーザー発信装置から発射される発信レーザー光束線が通過する孔が形成されていることを特徴とする光学走査装置。

【請求項3】 レーザー発信装置から探査目標物に向けて発信レーザー光束線を発射し、該探査目標物から反射された受信レーザー光束線を受信して探査目標物を走査する光学走査装置において、

光学走査装置本体の枠体に形成された装着孔に筒部が回転自在に装着された回転ミラー装置と、該回転ミラー装置を回転駆動する駆動手段とを有し、前記回転ミラー装置は、軸線が前記筒部の軸線と直角に交わる位置に設けられた開口部と、前記筒部の軸線に対し45度の角度で固定された第1のミラーとを備え、前記開口部には受信レーザー光束線を前記筒部内で集束する集束レンズが設けられていることを特徴とする光学走査装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、レーザー発信装置から探査目標物に向けて発信レーザー光束線を発射し、該探査目標物から反射された受信レーザー光束線を受信して探査目標物を走査する光学走査装置に関する。

【0002】

【従来の技術】コンクリート構造物は、古くなると、クラックが見た目だけでなく、コンクリート破片の落下等の危険がある。このため、コンクリート構造物にクラックの有無を検査する必要があった。かかる検査を、人間の目視で行うことは膨大な時間を費やすとともに、確実性に乏しい。

【0003】そこで、レーザー発信装置から探査目標物に向けて発信レーザー光束線を発射し、該探査目標物から反射された受信レーザー光束線を受信して探査目標物を走査する光学走査装置が提案されている。この公知の

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光学走査装置は、レーザー発信装置とレーザー受信装置とが異なる位置に設けられており、レーザー発信装置は、回転ミラーを介してレーザー光束線を照射して走査するように構成されている。

【0004】

【発明が解決しようとする課題】しかしながら、上記した従来の光学走査装置は、レーザー発信装置とその反射光を受信するレーザー受信装置が別体となっているため、回転ミラーを介してレーザー光束線を照射し走査しても、レーザー受信装置が受けられる受信レーザー光束線のレーザー受信装置が向いている範囲内に限られている。従って、従来の光学走査装置では360°の走査ができず、探査目標物がほぼ360°にまたがる場合には数回に分けて走査しなければならないという問題があつた。

【0005】本発明は、上記した従来の問題を解消し、コンクリート構造物等の探査目標物を360°の範囲で、しかも高速で光学走査することができる光学走査装置を提供することを目的としている。

【0006】

【課題を解決するための手段】本発明は、上記目的を達成するために、レーザー発信装置から探査目標物に向けて発信レーザー光束線を発射し、該探査目標物から反射された受信レーザー光束線を受信して探査目標物を走査する光学走査装置において、光学走査装置本体の枠体に形成された装着孔に筒部が回転自在に装着された回転ミラー装置と、該回転ミラー装置を回転駆動する駆動手段とを有し、前記回転ミラー装置は、軸線が前記筒部の軸線と直角に交わる位置に設けられた開口部と、前記筒部の軸線に対し45度の角度で固定された第1のミラーとを備え、前記探査目標物に対する発信及び受信レーザー光束線が前記筒部を通り、前記第1のミラーにより前記発信及び受信レーザー光束線が90度曲折されて前記開口部を通過することを特徴としている。

【0007】さらに、本発明は上記目的を達成するため、光学走査装置本体側に設けられ、前記筒部の軸線に対し45度の角度で固定された第2のミラーを有し、該第2のミラーに前記レーザー発信装置から発射される発信レーザー光束線が通過する孔が形成されていることを特徴としている。

【0008】さらにまた、本発明は上記目的を達成するために、光学走査装置本体の枠体に形成された装着孔に筒部が回転自在に装着された回転ミラー装置と、該回転ミラー装置を回転駆動する駆動手段とを有し、前記回転ミラー装置は、軸線が前記筒部の軸線と直角に交わる位置に設けられた開口部と、前記筒部の軸線に対し45度の角度で固定された第1のミラーとを備え、前記開口部には受信レーザー光束線を前記筒部内で集束する集束レンズが設けられていることを特徴としている。

【0009】

【作用】上記構成によれば、光学走査装置本体の枠体に形成された装着孔に筒部が回転自在に装着された回転ミラー装置と、該回転ミラー装置を回転駆動する駆動手段とを有し、回転ミラー装置は、軸線が筒部の軸線と直角に交わる位置に設けられた開口部と、筒部の軸線に対し45度の角度で固定された第1のミラーとを備え、探査目標物に対する発信及び受信レーザー光束線が筒部を通り、前記第1のミラーにより前記発信及び受信レーザー光束線が90度曲折されて前記開口部を通過するので、回転ミラー装置を筒部の軸線の回りを回転することにより、開口部が1回転するため、探査目標物に対し360°光学走査することができる。

【0010】

【実施例】以下、本発明の実施例に添付図面に従って説明する。図1は、本発明に係る一実施例を示す断面図である。図1において、光学走査装置の一部を構成する回転ミラー装置1は、そのミラー装置本体側部に固定された筒部2を有し、筒部2は光学走査装置本体10の枠体11に2つのペアリング3、4を介して回転自在に支持されている。この筒部2には、歯車の歯5が形成され、この歯5は速度調整可能な駆動手段としての電動モーター12の軸に固定された歯車12aに巻き掛けられて駆動するタイミングベルト13が巻き掛けられており、これにて回転ミラー装置1は筒部2の軸線2aを中心として回転される。筒部2の末端には、回転ミラー装置1の角度設定測定用の光学式回転変換器6が設けられている。また、回転ミラー装置1内には回転軸線2aに対して45度の角度で配置された第1ミラー7が固定されており、該第1ミラー7は後述する発信レーザー光束線20及び受信レーザー光束線21を90度に曲折する用をなす。回転ミラー装置1の本体外側面には、光束線取り入れ用開口部が形成され、開口部に中心に孔8aを有するレンズ8が取付られている。このレンズ8は、回転ミラー装置1の光束線取り入れ用開口部を閉鎖し、該装置の回転による空気抵抗を最小限にしている。

【0011】光学走査装置本体10には、回転ミラー装置1の回転軸線2a上に、レーザー発信装置14が設けられ、レーザー発信装置14は回転軸線2a上に上記第1ミラー7に向けてレーザー光束線20を発射する。レーザー発信装置14と回転ミラー装置1の間には、45度の角度で配置された第2ミラーとしての固定ミラー15と、中心に孔16aが開いているもう1つのレンズ16とが並列して配置され、固定ミラー15にも回転軸線2a上に孔15aが開けられている。固定ミラー15に対し回転軸線2aと90度に曲折した方向には結像レンズ17を介して受信レーザー光束線21を感知するレーザー受信装置18が設けられている。

【0012】かく構成の光学走査装置は、レーザー発信装置14がレーザー光束線20を発射するとき、回転ミラー装置1が電動モーター12によって回転軸線2aを

中心として回転される。発射されたレーザー光束線20は、固定ミラー15、レンズ16の孔15a、16aを通り、筒部2から回転ミラー装置1に進み、ここで第1ミラー7によって90度に曲折され、レンズ8の孔8aから探査目標物に向かう。そして、探査目標物を反射して戻ってきた受信レーザー光束線21はレンズ8の大きさで装置内に取り入れられるが、レンズ8によって光束線の断面は縮小される。そして、第1ミラー7によって90度に曲折され、筒部2のほぼ中央で最も縮小された後、レンズ16により取り入れ時の断面に戻され、固定ミラー15で90度に曲折される。固定ミラー15を曲折された受信レーザー光束線21は、結像レンズ17によってレーザー受信装置18の感知部に結像される。

【0013】かくして、光学走査装置は回転ミラー装置1内に回転軸線2aに平行な発信レーザー光束線20及び受信レーザー光束線21を直角に曲折する第1ミラー7を設けたので、回転ミラー装置1をその回転軸線2aを中心にして360度回転することにより、回転ミラー装置から発射されたレーザー光束線が探査目標物の全周面を照射することできる。従って、光学走査装置は例えば自動車、列車のような車両31の進行方向と発射されたレーザー光束線とが直角になるように搭載し、回転ミラー装置1を回転させながら車両を、例えばトンネルのような円筒形の探査目標物壁面と平行に移動した場合、図2に示すように、探査目標物体30の面にレーザー光束線による螺旋状の走査線が形成される。この走査線は車両の走行速度を調整することにより、探査目標物の全面がこの螺旋状に形成されたレーザー光束線20で覆うようになることも可能である。

【0014】さらに、光学走査装置は孔の開いた固定ミラー15、レンズ16及びレンズ8を用いたことにより、発信レーザー光束線20及び受信レーザー光束線21を1つの開口部から発信及び受信できる。

【0015】さらにまた、受信レーザー光束線21はレンズ8によって光束線の断面が筒部2のほぼ中央で最も縮小されるので、径の小さいペアリング3、4を使用でき、ペアリング抵抗が減ると共に、回転ミラー装置1の回転速度を速くすることができる。

【0016】【発明の効果】請求項1の構成によれば、光学走査装置は回転ミラー装置内に回転軸線に平行な発信レーザー光束線及び受信レーザー光束線を直角に曲折するミラーを設けたので、回転ミラー装置をその回転軸線を中心にして360度回転することができ、回転ミラー装置から発射されたレーザー光束線が探査目標物の全周面を照射することができる。

【0017】請求項2の構成によれば、発信レーザー光束線及び受信レーザー光束線を1つの開口部から発信及び受信できる。

【0018】請求項3の構成によれば、受信レーザー光

束線はレンズによって光束線の断面が筒部のほぼ中央で最も縮小されるので、径の小さいペアリングを使用でき、ペアリング抵抗が減ると共に、回転ミラー装置の回転速度を速くすることができる。

【図面の簡単な説明】

【図1】図1は本発明に係る光学走査装置の断面図である。

【図2】図2は光学走査時の一例を示す斜視図である。

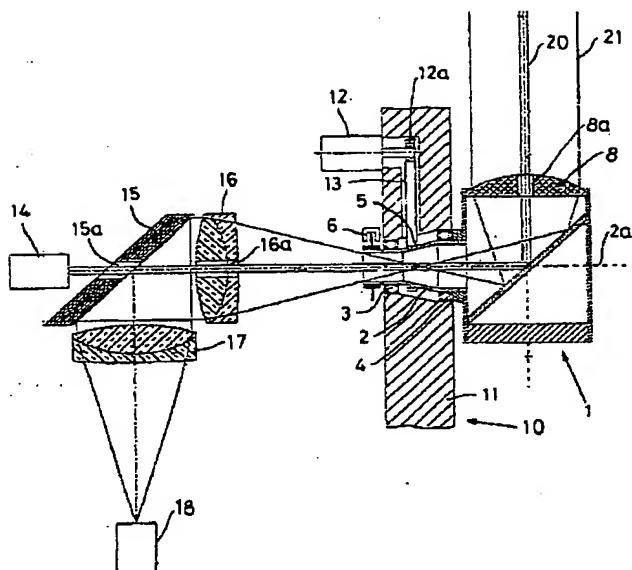
【符号の説明】

1 回転ミラー装置

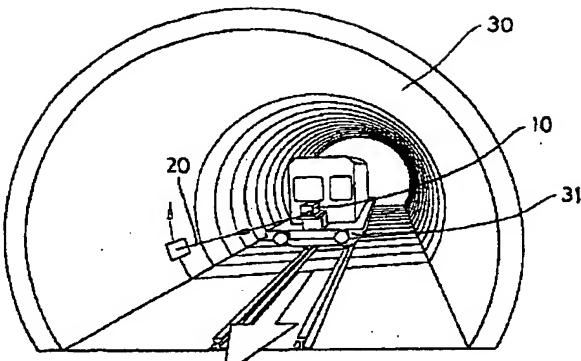
二 筒部

- * 2 a 回転軸線
- 7 第1ミラー
- 8 レンズ
- 1 0 光学走査装置本体
- 1 1 枠体
- 1 2 電動モーター
- 1 4 レーザー発信装置
- 1 5 固定ミラー
- 1 8 レーザー受信装置
- 0 2 0 発信レーザー光束線
- 2 1 受信レーザー光束線

【图1】



【图2】



【手続補正書】

【提出日】平成6年2月3日

【手続補正 1】

【補正対象書類名】明細書

【補正対象項目名】 0012

【補正方法】変更

【補正内容】
【0012】かく構成の光学走査装置は、レーザー発信装置14がレーザー光束線20を発射するとき、回転ミラー装置1が電動モーター12によって回転軸線2aを中心として回転される。発射されたレーザー光束線20は、固定ミラー15、レンズ16の孔15a、16aを通り、筒部2から回転ミラー装置1に進み、ここで第1ミラー7によって90度に曲折され、レンズ8の孔8aから探査目標物に向かう。そして、探査目標物から反射

して戻ってきた受信レーザー光束線21はレンズ8の大きさで装置内に取り入れられるが、レンズ8によって光束線の断面は縮小される。そして、第1ミラー7によって90度に曲折され、筒部2のほぼ中央で最も縮小された後、レンズ16により取り入れ時の断面に戻され、固定ミラー15で90度に曲折される。固定ミラー15を曲折された受信レーザー光束線21は、結像レンズ17によってレーザー受信装置18の感知部に結像される。

【手続補正2】

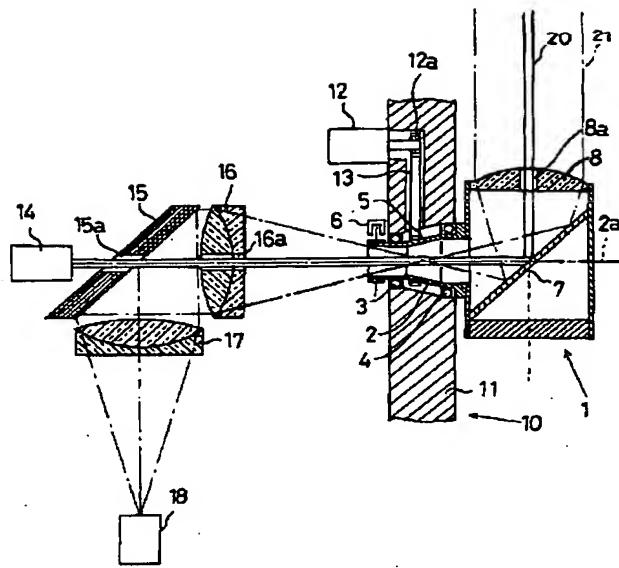
【補正対象書類名】図面

【補正対象項目名】図1

【補正方法】麥更

【補正內容】

[图 1]



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : AMBERG MEASURING TECHNIK LTD
FUJI BUSSAN KK

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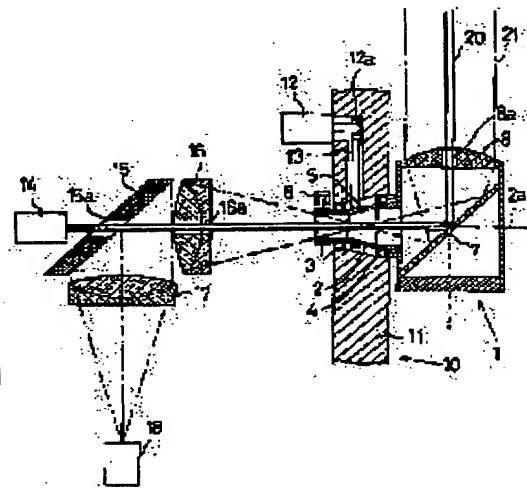
(72)Inventor : FELIX AMBERG

(54) OPTICAL SCANNING APPARATUS

(57)Abstract:

PURPOSE: To carry out optical scanning of the whole circumferential surface of a concrete building or the like at high speed without missing any part by installing a mirror to curve transmitted and received laser luminous fluxes in parallel to a rotation axial line in a rotation mirror apparatus and rotating the rotation mirror on the rotation axial line at 360 degrees.

CONSTITUTION: When a laser oscillator 14 emits laser luminous fluxes 20, an electric motor 12 is driven and a rotation mirror apparatus 1 is rotated on a rotation axial line 2a. The emitted laser light fluxes 20 pass through a mixed mirror 15 and a hole 16a of a lens 16, proceed to the rotation mirror 1 from a barrel part 2, is curved at 90 degrees by a mirror 7, and after that, the fluxes move toward an aiming object through a hole 8a of a lens 8. The received laser light fluxes 21 reflected by the aiming object pass through the lens 8, are curved at 90 degrees by the mirror 7, and throttled by the center of a barrel part 2, and after that, the fluxes are turned back to have the original cross-section surface area at the time of intake by the lens 16 and curved at 90 degrees by a fixed mirror 15. The curved received laser light 21 are converged to form an image on a detecting part of a laser reception apparatus 18 by an image forming lens 17 and thus 360° -scanning is made possible.



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[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] In the optical scanner which discharges a dispatch laser flux of light line towards an inquiry object from a laser sender, receives the receiving laser flux of light line reflected from this inquiry object, and scans an inquiry object. It has the rotation mirror equipment with which the wearing hole formed in the frame of the body of an optical scanner was equipped with the cylinder part free [rotation], and the driving means which carries out the rotation drive of this rotation mirror equipment. Said rotation mirror equipment It has opening by which the axis was formed in the location at which the axis and right angle of said cylinder part are crossed, and the 1st mirror fixed at the include angle of 45 degrees to the axis of said cylinder part. The optical scanner characterized by for the dispatch to said inquiry object and a receiving laser flux of light line passing along said cylinder part, and for said dispatch and a receiving laser flux of light line bending 90 degrees by said 1st mirror, and passing said opening.

[Claim 2] The optical scanner characterized by forming the hole which the dispatch laser flux of light line which is formed in the body side of an optical scanner, has the 2nd mirror fixed at the include angle of 45 degrees to the axis of said cylinder part in an optical scanner according to claim 1, and is discharged by this 2nd mirror from said laser sender passes.

[Claim 3] In the optical scanner which discharges a dispatch laser flux of light line towards an inquiry object from a laser sender, receives the receiving laser flux of light line reflected from this inquiry object, and scans an inquiry object. It has the rotation mirror equipment with which the wearing hole formed in the frame of the body of an optical scanner was equipped with the cylinder part free [rotation], and the driving means which carries out the rotation drive of this rotation mirror equipment. Said rotation mirror equipment The optical scanner which is equipped with opening by which the axis was formed in the location at which the axis and right angle of said cylinder part are crossed, and the 1st mirror fixed at the include angle of 45 degrees to the axis of said cylinder part, and is characterized by preparing the focusing lens which converges a receiving laser flux of light line on said opening within said cylinder part.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention discharges a dispatch laser flux of light line towards an inquiry object from a laser sender, and relates to the optical scanner which receives the receiving laser flux of light line reflected from this inquiry object, and scans an inquiry object.

[0002]

[Description of the Prior Art] When the concrete structure becomes old, risk, such as fall of not only appearance but a concrete fragment, has a crack. For this reason, the existence of a crack needed to be inspected to the concrete structure. It is lacking in certainty to conduct this inspection by viewing of human being while spending huge time amount.

[0003] Then, a dispatch laser flux of light line is discharged towards an inquiry object from a laser sender, and the optical scanner which receives the receiving laser flux of light line reflected from this inquiry object, and scans an inquiry object is proposed. This well-known optical scanner is formed in the location where a laser sender differs from a laser receiving set, and the laser sender is constituted so that a laser flux of light line may be irradiated and may be scanned through a rotation mirror.

[0004]

[Problem(s) to be Solved by the Invention] However, since the laser sender and the laser receiving set which receives the reflected light serve as another object, even if the above-mentioned conventional optical scanner irradiates and scans a laser flux of light line through a rotation mirror, it is restricted within limits which the laser receiving set of the receiving laser flux of light line which a laser receiving set can receive has turned to. Therefore, in the conventional optical scanner, a 360-degree scan was not completed, but when an inquiry object straddled about 360 degrees, there was a problem that it had to scan in several steps.

[0005] This invention solves the above-mentioned conventional problem, and aims at offering the optical scanner which the range of is 360 degrees and can moreover carry out the optical scan of the inquiry objects, such as the concrete structure, at high speed.

[0006]

[Means for Solving the Problem] In the optical scanner which discharges a dispatch laser flux of light line towards an inquiry object from a laser sender, receives the receiving laser flux of light line reflected from this inquiry object, and scans an inquiry object in order that this invention may attain the above-mentioned purpose. It has the rotation mirror equipment with which the wearing hole formed in the frame of the body of an optical scanner was equipped with the cylinder part free [rotation], and the driving means which carries out the rotation drive of this rotation mirror equipment. Said rotation mirror equipment It has opening by which the axis was formed in the location at which the axis and right angle of said cylinder part are crossed, and the 1st mirror fixed at the include angle of 45 degrees to the axis of said cylinder part. It is characterized by for the dispatch to said inquiry object and a receiving laser flux of light line passing along said cylinder part, and for said dispatch and a receiving laser flux of light line bending 90 degrees by said 1st mirror, and passing said opening.

[0007] Furthermore, in order that this invention may attain the above-mentioned purpose, it is prepared in the body side of an optical scanner, has the 2nd mirror fixed at the include angle of 45 degrees to the axis of said cylinder part, and is characterized by forming the hole which the dispatch laser flux of light line discharged by this 2nd mirror from said laser sender passes.

[0008] The rotation mirror equipment with which the wearing hole formed in the frame of the body of an optical scanner was equipped with the cylinder part free [rotation] further again in order that this invention might attain the above-mentioned purpose. It has the driving means which carries out the rotation drive of this rotation mirror equipment. Said rotation mirror equipment It is characterized by preparing the focusing lens with which an axis is equipped with opening prepared in the location at which the axis and right angle of said cylinder part are crossed, and the 1st mirror fixed at the include angle of 45 degrees to the axis of said cylinder part, and converges a receiving laser flux of light line on said opening within said cylinder part.

[0009]

[Function] The rotation mirror equipment with which the wearing hole formed in the frame of the body of an optical scanner was equipped with the cylinder part free [rotation] according to the above-mentioned configuration, It has the driving means which carries out the rotation drive of this rotation mirror equipment. Rotation mirror equipment It has opening by which the axis was formed in the location at which the axis and right angle of a cylinder part are crossed, and the 1st mirror fixed at the include angle of 45 degrees to the axis of a cylinder part. Since the dispatch to an inquiry object and a receiving laser flux of light line pass along a cylinder part, said dispatch and a receiving laser flux of light line bend 90 degrees by

said 1st mirror and said opening is passed. Since opening rotates rotation mirror equipment one time by rotating the surroundings of the axis of a cylinder part, 360-degree optical scan can be carried out to an inquiry object.

[0010]

[Example] Hereafter, it explains to the example of this invention according to an accompanying drawing. Drawing 1 is the sectional view showing one example concerning this invention. In drawing 1, the rotation mirror equipment 1 which constitutes some optical scanners has the cylinder part 2 fixed to the body flank of mirror equipment, and the cylinder part 2 is supported by the frame 11 of the body 10 of an optical scanner free [rotation] through two bearings 3 and 4. In this cylinder part 2, a gearing's gear tooth 5 is formed, timing ** RUTO 13 which this gear tooth 5 is wound around gearing 12a fixed to the shaft of the electrical motor 12 as a driving means which can regulate the speed, and it is hung, and is driven is rolled almost, and rotation mirror equipment 1 rotates axis 2a of a cylinder part 2 as a core now. The optical rotational transform machine 6 for include-angle setting measurement of rotation mirror equipment 1 is formed in the end of a cylinder part 2. Moreover, in rotation mirror equipment 1, the 1st mirror 7 arranged at the include angle of 45 degrees to axis-of-rotation 2a is being fixed, and this 1st mirror 7 makes the business which bends the dispatch laser flux of light line 20 and the receiving laser flux of light line 21 which are mentioned later at 90 degrees. the lens 8 which opening for flux of light line introduction is formed in the body lateral surface of rotation mirror equipment 1, and has hole 8a in opening at the core -- attachment *****. This lens 8 closes opening for flux of light line introduction of rotation mirror equipment 1, and makes the minimum the air resistance by rotation of this equipment.

[0011] On the body 10 of an optical scanner, the laser sender 14 is formed on axis-of-rotation 2a of rotation mirror equipment 1, and the laser sender 14 discharges the laser flux of light line 20 towards the 1st mirror 7 of the above on axis-of-rotation 2a. The fixed mirror 15 as the 2nd mirror arranged at the include angle of 45 degrees between the laser sender 14 and rotation mirror equipment 1 and another lens 16 which hole 16a is opening at the core stood in a row, and has been arranged, and hole 15a has opened on axis-of-rotation 2a also at the fixed mirror 15. The laser receiving set 18 which senses the receiving laser flux of light line 21 through the image formation lens 17 is formed in the direction bent at axis-of-rotation 2a and 90 degrees to the fixed mirror 15.

[0012] When, as for the optical scanner of a configuration of writing, the laser sender 14 discharges the laser flux of light line 20, rotation mirror equipment 1 rotates axis-of-rotation 2a as a core by the electrical motor 12. The discharged laser flux of light line 20 passes along the holes 15a and 16a of the fixed mirror 15 and a lens 16, progresses to rotation mirror equipment 1 from a cylinder part 2, by the 1st mirror 7, is bent at 90 degrees and faces to an inquiry object from hole 8a of a lens 8 here. And although the receiving laser flux of light line 21 which reflected the inquiry object and has returned is taken in in equipment in the magnitude of a lens 8, the cross section of a flux of light line is reduced with a lens 8. And it bends at 90 degrees by the 1st mirror 7, and after [a cylinder part 2] being mostly reduced most in the center, it is returned to the cross section of harvesting time with a lens 16, and bends at 90 degrees by the fixed mirror 15. Image formation of the receiving laser flux of light line 21 which bent the fixed mirror 15 is carried out to the sensor of the laser receiving set 18 with the image formation lens 17.

[0013] In this way, since the optical scanner formed the 1st mirror 7 which bends the dispatch laser flux of light line 20 parallel to axis-of-rotation 2a, and the receiving laser flux of light line 21 at a right angle in rotation mirror equipment 1, by rotating rotation mirror equipment 1 360 degrees focusing on the axis-of-rotation 2a, the laser flux of light line discharged from rotation mirror equipment irradiates the perimeter side of an inquiry object, and it can carry out the thing of it. Therefore, an optical scanner is carried so that the travelling direction of a car 31 like an automobile and a train and the discharged leather flux of light line may become a right angle, and rotate rotation mirror equipment 1, when a car is moved to the inquiry object wall surface of a cylindrical shape like a tunnel, and parallel, as shown in drawing 2, the spiral scanning line by the laser flux of light line is formed in the field of the inquiry target body 30. By adjusting the travel speed of a car, this scanning line can also be made for the whole surface of an inquiry object to cover by this laser flux of light line 20 formed spirally.

[0014] Furthermore, an optical scanner can send and receive the dispatch laser flux of light line 20 and the receiving laser flux of light line 21 from one opening by having used the fixed mirror 15, the lens 16, and lens 8 which the hole opened.

[0015] further -- again -- the receiving laser flux of light line 21 -- a lens 8 -- the cross section of a flux of light line -- a cylinder part 2 -- since it is mostly reduced most in the center, while the small bearings 3 and 4 of a path can be used and bearing resistance decreases, rotational speed of rotation mirror equipment 1 can be made quick.

[0016]

[Effect of the Invention] According to the configuration of claim 1, since it prepared the mirror which bends a dispatch laser flux of light line parallel to axis of rotation, and a receiving laser flux of light line at a right angle in rotation mirror equipment, an optical scanner can rotate rotation mirror equipment 360 degrees focusing on the axis of rotation, and the laser flux of light line discharged from rotation mirror equipment irradiates the perimeter side of an inquiry object, and it can carry out the thing of it.

[0017] According to the configuration of claim 2, a dispatch laser flux of light line and a receiving laser flux of light line can be sent and received from one opening.

[0018] according to the configuration of claim 3 — a receiving laser flux of light line — a lens — the cross section of a flux of light line — a cylinder part — since it is mostly reduced most in the center, while the small bearing of a path can be used and bearing resistance decreases, rotational speed of rotation mirror equipment can be made quick.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the sectional view of the optical scanner concerning this invention.

[Drawing 2] Drawing 2 is the perspective view showing an example at the time of an optical scan.

[Description of Notations]

1 Rotation Mirror Equipment

2 Cylinder Part

2a Axis of rotation

7 1st Mirror

8 Lens

10 Body of Optical Scanner

11 Frame

12 Electrical Motor

14 Laser Sender

15 Fixed Mirror

18 Laser Receiving Set

20 Dispatch Laser Flux of Light Line.

21 Receiving Laser Flux of Light Line

[Translation done.]

* NOTICES *

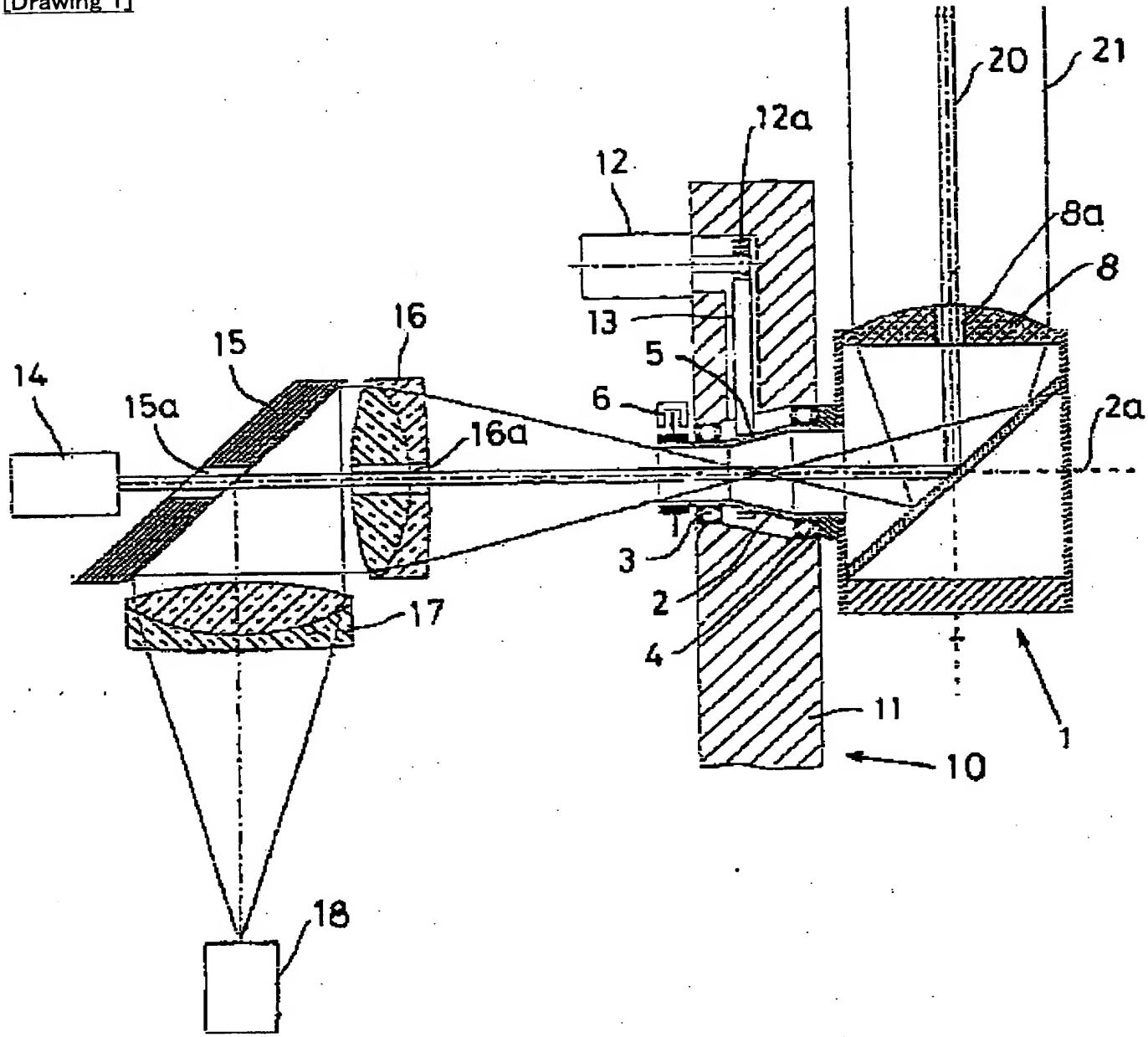
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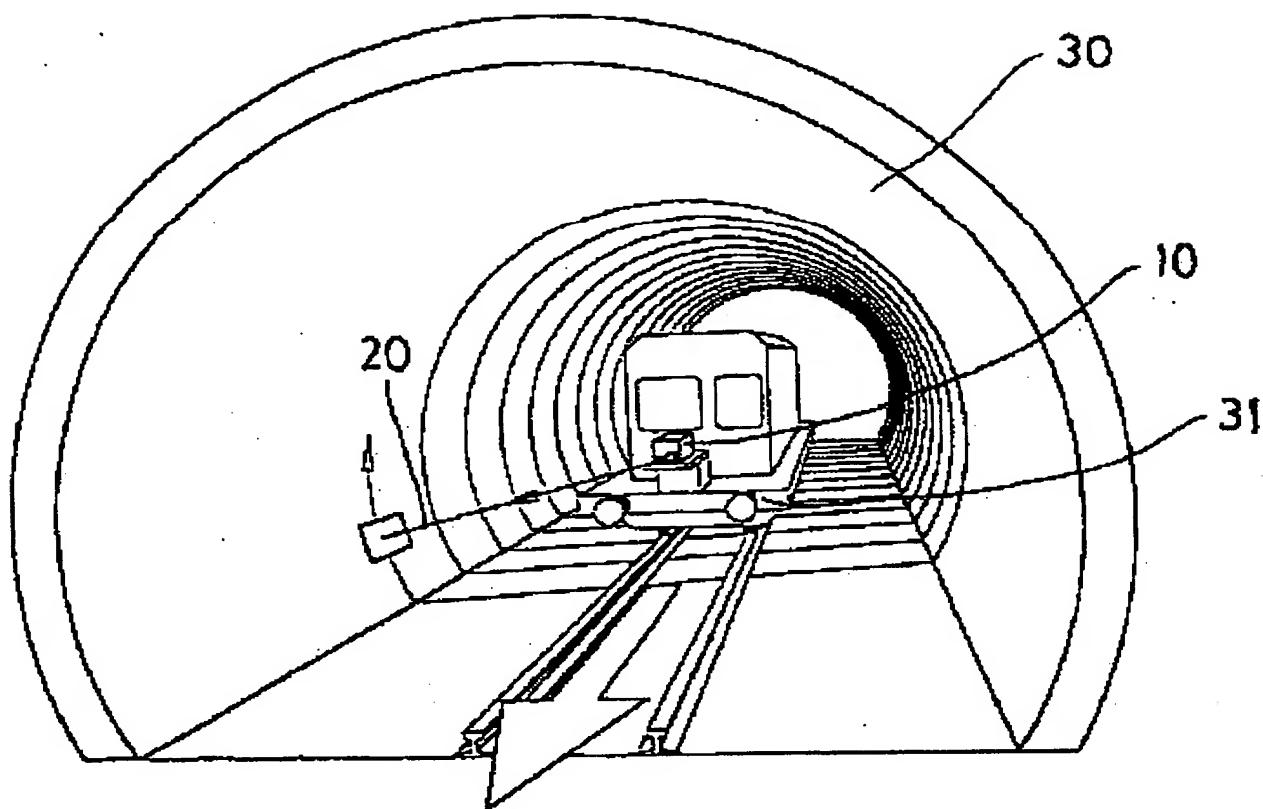
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DRAWINGS

[Drawing 1]



[Drawing 2]



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